

PATENT ABSTRACTS OF JAPAN

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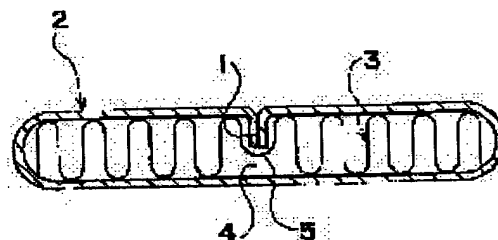
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(54) FLAT TUBE FOR HEAT EXCHANGER

(57)Abstract:

PROBLEM TO BE SOLVED: To reduce man-hours required for inserting an inner fin and to improve mass production property by inserting a recessed curved part for connection into the gap between the butt part of a tube body and a surface center and arranging an inner fin at both the sides of the butt part.

SOLUTION: A tube body 2 is bent in a width direction, and both the end parts are bent and formed at the side of an inner surface and are subjected to butting on an opposing flat surface, thus forming a butt part 1. Then, a gap 4 is formed between the tip part of the butt part 1 and the center of the inside of the tube. Then, a corrugated inner fin 3 that is inserted into the tube body 2 is bent and formed in a corrugation with a fixed pitch. At the same time, a recessed part 5 for connection with a pitch that is different from other corrugation pitches is formed at a central position in the advance direction of the wave. The corrugated inner fin 3 is entirely inserted into the tube body 2 so that the recessed part 5 for connection can be inserted into the gap 4. Then, the corrugated inner fin 3 is arranged essentially equally at both the ends with the butt part 1 as a boundary.



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CLAIMS

[Claim(s)]

[Claim 1] ** material bends crosswise, and both the edge is formed in an inside side cross-section inverse L-shaped, respectively, and it has the comparison section 1 which the inverted-L character counters and which is compared in respect of flat. In the flat tube for heat exchangers possessing the body 2 of a tube with which the whole was formed in the shape of an abbreviation cross section of B characters, and the wave type inner fin 3 with which ups-and-downs shaping was carried out at the wave type, and thin metal strip material was contained by the body 2 after formation of said body 2 of a tube Said body 2 of a tube between the tip of the comparison section 1, and the tube inside which counters it What has the clearance 4 more than the thickness of the metal strip material of said wave type inner fin 3 is used. Said wave type inner fin 3 The direction of a ridgeline of each of that wave is located in parallel with the longitudinal direction of the body 2 of a tube. That by which ups-and-downs formation of the different concave bend section 5 for passages from wave types other than the part was carried out is used for the crosswise center position. The flat tube for heat exchangers characterized by having inserted the concave bend section 5 for passages in said clearance 4 between the centers of an inside which counter said comparison section 1 and it of said body 2 of a tube, and for the wave type inner fin 3 of one having compared, and having been arranged at the both sides of the section 1.

[Claim 2] The flat tube for heat exchangers arranged so that the center of said concave bend section 5 for passages may not contact the inside of the body 2 of a tube in claim 1.

[Claim 3] The flat tube for heat exchangers arranged so that the center of said concave bend section 5 for passages may contact the inside of the body 2 of a tube in claim 1.

[Claim 4] The flat tube for heat exchangers arranged so that the center of said concave bend section 5 for passages may contact the tip of said comparison section 1 of the body 2 of a tube, and an inside in claim 1.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the flat tube for heat exchangers with which the inner fin was inserted in the body of a tube with which the cross section was formed in the shape of abbreviation for B characters.

[0002]

[Description of the Prior Art] This kind of conventional flat tube was formed like drawing 6 and drawing 7. That is, the body 2 of a tube formed in the shape of cross-section abbreviation for B characters bends ** material crosswise, fabricates both the edge to cross-section inverse L-shaped at an inside side, respectively, and has the comparison section 1 which counters and which is compared in respect of flat. And into the body 2 of a tube, respectively separate independent wave type inner fin 3a and wave type inner fin 3b are inserted bordering on the comparison section 1. In addition, that with which the body 2 of a tube is in the condition of the metal strip material, among those wax material was covered outside is used in many cases, and the whole inserts into a furnace — having — wax material — fusing — comparing — the section 1 — liquid — while joining densely, soldering immobilization of between the wave type inner fins 3a and 3b and body of tube 2 insides is carried out in one.

[0003]

[Problem(s) to be Solved by the Invention] Such a conventional flat tube for the heat exchangers containing an inner fin had many man days concerning insertion of the inner fin, and had the fault which lacks in mass-production nature. Then, this invention makes it a technical problem to solve this fault.

[0004]

[Means for Solving the Problem] ** material bends this invention according to claim 1 crosswise, and both the edge is formed in an inside side cross-section inverse L-shaped, respectively, and it has the comparison section 1 which the inverted-L character counters and which is compared in respect of flat. In the flat tube for heat exchangers possessing the body 2 of a tube with which the whole was formed in the shape of an abbreviation cross section of B characters, and the wave type inner fin 3 with which ups-and-downs shaping was carried out at the wave type, and thin metal strip material was contained by the body 2 after formation of said body 2 of a tube. Said body 2 of a tube between the tip of the comparison section 1, and the tube inside which counters it. What has the clearance 4 more than the thickness of the metal strip material of said wave type inner fin 3 is used. Said wave type inner fin 3 The direction of a ridgeline of each of that wave is located in parallel with the longitudinal direction of the body 2 of a tube. That by which ups-and-downs formation of the different concave bend section 5 for passages from wave types other than the part was carried out is used for the crosswise center position. It is the flat tube for heat exchangers characterized by having inserted the concave bend section 5 for passages in said clearance 4 between the centers of an inside which counter said comparison section 1 and it of said body 2 of a tube, and for the wave type inner fin 3 of one having compared, and having been arranged at the both sides of the section 1.

[0005] This invention according to claim 2 is a flat tube for heat exchangers with which the

center of said concave bend section 5 for passages has been arranged so that the inside of the body 2 of a tube may not be contacted in claim 1. This invention according to claim 3 is a flat tube for heat exchangers with which the center of said concave bend section 5 for passages has been arranged so that the inside of the body 2 of a tube may be contacted in claim 1. This invention according to claim 4 is a flat tube for heat exchangers with which the center of said concave bend section 5 for passages has been arranged so that the tip of said comparison section 1 of the body 2 of a tube and an inside may be contacted in claim 1.

[0006]

[Embodiment of the Invention] Next, based on a drawing, it explains per gestalt of operation of this invention. Drawing 1 is the cross-section explanatory view of the flat tube for heat exchangers of this invention, and it is the cross-section enlarged drawing in which drawing 2 shows the important section strabism schematic drawing of the wave type inner fin 3, and drawing 3 shows the condition after the soldering. Moreover, drawing 4 is the important section cross-sectional view showing the gestalt of other operations of this invention, and drawing 5 is the cross-sectional view showing the gestalt of other operations further. In the example of drawing 1 - drawing 3, the body 2 of a tube uses that with which the wax material which becomes front flesh-side both sides of the metal plate made from aluminum from an aluminum alloy as an example was covered. And it is bent crosswise with a foaming machine, ups-and-downs shaping of both the edge is carried out at an inside side cross-section inverse L-shaped, respectively, and it compares in respect of [the / which counters] flat, and compares there, and the section 1 is constituted. And the clearance 4 which becomes enough is formed between the tip of the comparison section 1, and the center of a tube inside.

[0007] Next, compared with the body 2 of a tube, as for the wave type inner fin 3 inserted in this body 2 of a tube, ups-and-downs formation of it is carried out by the fin making machine at the wave type of a constant pitch using the remarkable thin aluminum ** material of board thickness. With it, the different concave bend section 5 for passages from other wave type pitches is formed in the mid gear of the travelling direction of the wave. In addition, this concave bend section 5 for passages may extend and form only the center section of the fin formed in the constant pitch as a simple approach. The depth of the trough of this concave bend section 5 for passages is deeper than the cross-section die length of the comparison section 1 of the body 2 of a tube. Thus, as the becoming wave type inner fin 3 is inserted in the concave bend section 5 for passages by the clearance 4, the whole is inserted into the body 2 of a tube like drawing 1. And bordering on the comparison section 1, the wave type inner fin 3 is arranged equally substantially at the both sides. At this time, the ridgeline of each wave is located in parallel with the longitudinal direction of the body 2 of a tube.

[0008] Thus, like drawing 3, the outer fin 7 is arranged and a heat exchanger is usually assembled by the external surface of the assembled flat tube. And the whole is inserted into a hot furnace, melting of the wax material is carried out, soldering immobilization of between each part articles is carried out at one, and a heat exchanger is completed. Next, the example of drawing 4 is arranged so that the concave bend section 5 for passages of the wave type inner fin 3 may contact the inside of the body 2 of a tube. Furthermore, in the example of drawing 5, it compares, the clearance between the tip of the section 1 and the inside of the body 2 of a tube which counters it is maintained by board thickness extent of the wave type inner fin 3, and the concave bend section 5 for passages is inserted in the clearance. In this case, when the whole is soldered, it is soldered certainly in one through the wave type inner fin 3 between the tip of the comparison section 1, and the inside of the body 2 of a tube, and it can serve as a pressure-resistant high flat tube.

[0009]

[Function and Effect of the Invention] The tip of the comparison section 1 of the body 2 of a tube in which, as for the flat tube for heat exchangers of this invention, the whole was formed in the shape of cross-section abbreviation for B characters, A clearance 4 is formed between the tubes which counter it, and the concave bend section 5 for passages of the wave type inner fin 3 is inserted in the clearance 4. Since the wave type inner fin 3 of one compares and it is arranged at the both sides of the section 1, the manufacture man day of a flat tube decreases and the

high thing of mass-production nature can be offered. That is, even if the comparison section 1 exists, it is not necessary to compare two inner fins and to insert in the both sides of the section 1 like the former, respectively. The width of face of the wave type inner fin 3 becomes large, and it is easy to deal with it with it.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The cross-section explanatory view of the flat tube for heat exchangers of this invention.

[Drawing 2] Important section strabism schematic drawing of the wave type inner fin 3 of this flat tube.

[Drawing 3] The cross-section enlarged drawing showing the condition after soldering of this flat tube.

[Drawing 4] The important section cross-sectional view showing the gestalt of other operations of the flat tube for heat exchangers of this invention.

[Drawing 5] The cross-sectional view of the flat tube for heat exchangers of this invention showing the gestalt of other operations further.

[Drawing 6] The cross-section explanatory view of a conventional-type flat tube.

[Drawing 7] The cross-section explanatory view of other conventional-type flat tubes.

[Description of Notations]

- 1 Comparison Section
- 2 Body of Tube
- 3, 3a, 3b Wave type inner fin
- 4 Clearance
- 5 Concave Bend Section for Passages
- 6 Wax Material
- 7 Outer Fin

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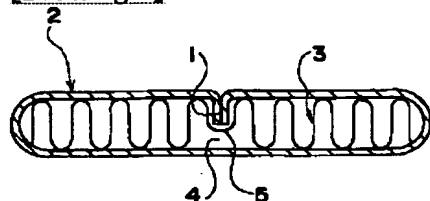
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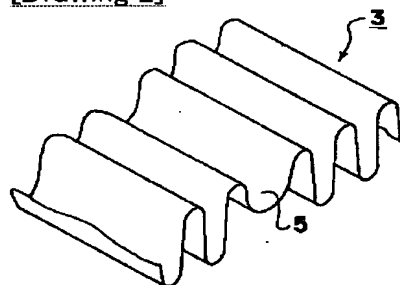
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DRAWINGS

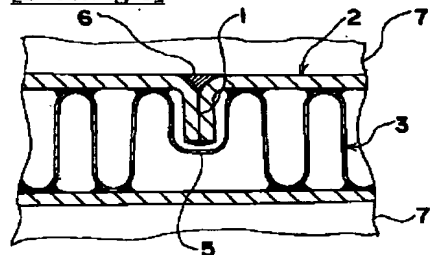
[Drawing 1]



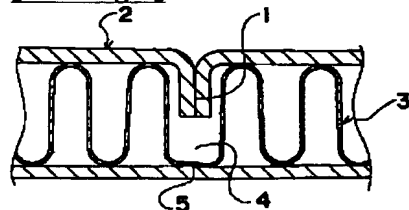
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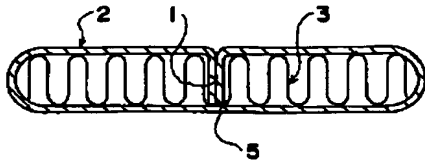
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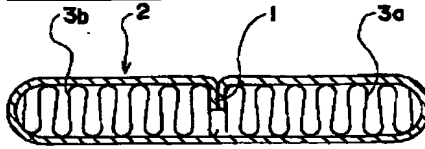
[Drawing 4]



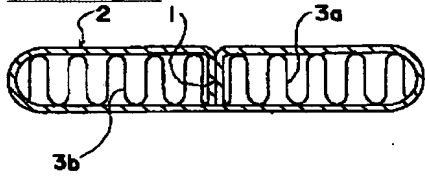
[Drawing 5]



[Drawing 6]



[Drawing 7]



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